



PATENT
Docket No. 361752000100

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Keunsuk P. CHANG et al.

Serial No.: 09/383,724

Filing Date: Aug. 26, 1999

For: BIAXIALLY ORIENTED
POLYPROPYLENE SLIP FILM FOR
PACKAGING WITH STABLE
COEFFICIENT OF FRICTION
PROPERTIES

Examiner: D. Lawrence Tarazano

Group Art Unit: 1773

DECLARATION OF KEUNSUK P. CHANG

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Keunsuk P. Chang declares under penalty of perjury under the laws of the United States of America as follows:

1. I am a citizen of the United States of America, residing at 31 Mayflower Ct., North Kingstown, RI 02852, USA. I am a co-inventor of the invention described and claimed in this application. I received a Bachelor's degree in Chemical Engineering in 1983 from Princeton University and a Master's degree in Chemical Engineering from University of Connecticut in 1985. After graduation, I joined employment at Mobil Chemical Company Films Division until 1995, working in various assignments in product development and manufacturing. In September 1996, I joined Toray Plastics(America), Inc (a subsidiary of Toray Industries) and have been at Toray Plastics (America), Inc. in product development since. Currently I am the Product Development Manager for the Torayfan division of Toray Plastics(America), Inc.

2. I have reviewed the Office Action dated December 4, 2003, and present this Declaration to provide evidence and explanations based on my knowledge and experience in this field of technology to show why certain factual statements made by the Examiner and conclusions he states in the Action are incorrect.

3. In response to the statement in the paragraph at the top of page 3 of the Action, that “a value of 0.08% rounds up to a value of 0.1%,” thus giving “the prior art [Shah U.S. Patent No. 6,291,063] value of 0.1[%] enough latitude to read on the applicant’s endpoint” of 0.08%, I offer the following information. At the time of the our invention, commercially available dosing and resin blending systems were already very capable of precise mixing and blending of very small quantities of additives. A target additive loading of 800 ppm (0.08%) could easily be achieved and maintained and was clearly distinguishable from a target additive loading of 1000 ppm (0.1%) using dosing systems readily available at the time of the invention.

4. Toray Plastics (America), Inc. purchased a commercial production-grade resin blender from Conair specifically for the commercial production of products in accordance with our invention in 1998 for the express purpose of accurate and precise dosing of the silicone oil additive in a production environment. The unit purchased from Conair was a model GB44x Autoweigh Gravimetric blender with additive feeders for precise metering and dosing of small amounts of additives. Product literature at the time of purchase touted a metering accuracy of 0.5 – 1.0% for each ingredient, as shown in the Conair product literature from September 1989 attached at Tab A citing an accuracy of 1.0%. My experience agrees with this advertisement of accuracy. In fact, I know of some dosing systems that have an accuracy as high as $\pm 0.05\%$ and can dispense as few as 3 to 4 pellets of an additive material to a large hopper batch containing 5000 lbs of resin pellets. The unit we purchased easily had a dosing accuracy of $\pm 1.0\%$. As such, a target value of 800 ppm (0.08%) for an additive with an error of $\pm 1.0\%$ would give a range of additive concentration from 792 ppm (0.0792%) to 808 ppm (0.0808%). A target value of 1000 ppm (0.10%) for an additive with an error of $\pm 1.0\%$ would give a range of additive concentration from 990 ppm (0.099%) to 1010 ppm (0.101%). Thus, it is readily apparent that

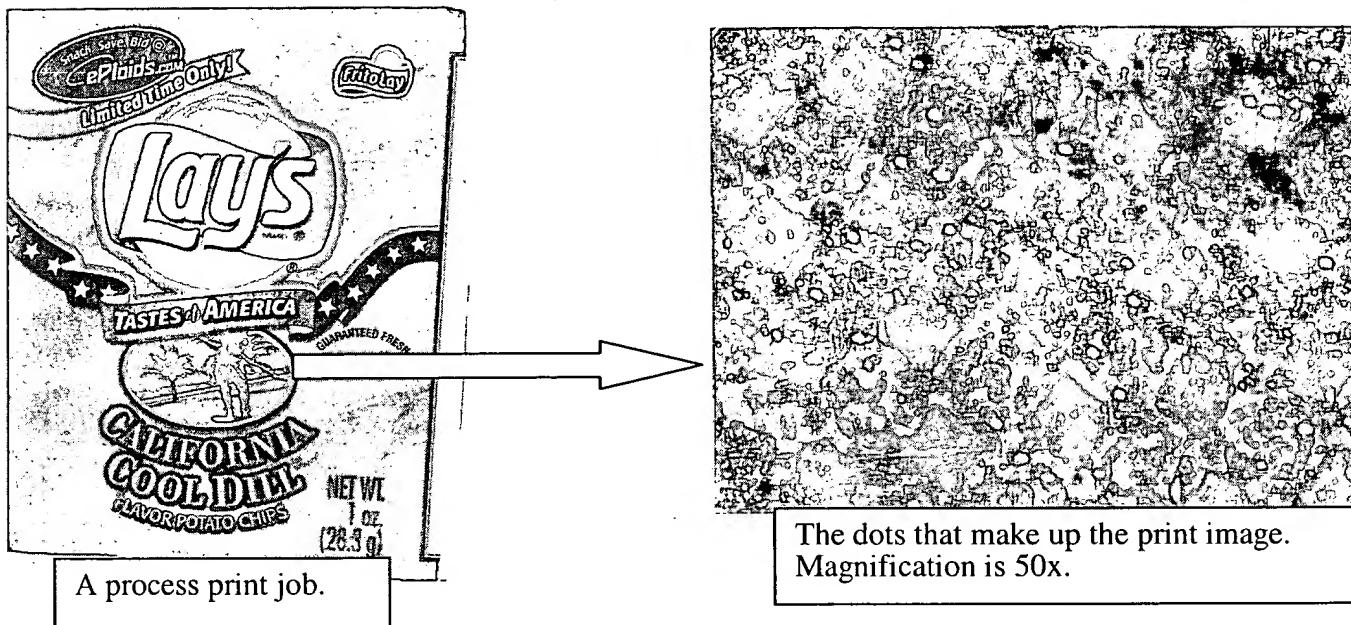
with such precise dosing systems commercially available, persons of ordinary skill in this field of technology could and would easily have distinguished between a 0.08% loading and a 0.1% loading of an additive. Persons of ordinary skill in this field of technology, with which I am very familiar, would never have considered it appropriate to round a 0.08% loading up to a 0.10% loading, which would imply an error of 20%, which is totally unreasonable and would likely produce unacceptable results.

5. With respect to the statement in paragraph 16 on page 6 of the Action, that “values of 0.08% and 0.1% are within scientific error of each other,” I cannot disagree more. “Scientific error” is a function of the measurement system, and the more accurate the measurement system, the smaller will be the error. With the accurate dosing systems available at the time (and even more accurate systems available today), a 0.08% additive loading is not “about” a 0.1% loading. Moreover, such accurate dosing of additives is critical in the packaging film industry in order to design precision performing films for many diverse properties and applications. The degree of scientific error experienced with dosing systems is, as noted above, in a range of $\pm 1\%$ of the additive dose, and, depending on which value is the base of comparison, values of 0.08 and 0.10 vary from one another by an error of 20% (if 0.10 is the base) or 25% (if 0.08 is the base).

6. I also present this Declaration to provide some explanation about “printability” in the packaging film industry in response to statements made in paragraph 17 on pages 6-7 of the Action. Flexible packaging, particularly for the snack food industry, requires complex printing graphics and multiple impressions to obtain a full palette of colors and shades for consumer appeal and visual “pop.” This type of printing is known as “process printing” whereby engraved print rollers or flexographic plates carry the print image, which itself is made up of microscopic “dots” (see Figure 1 reproduced below). In order to gain the full range of colors, the primary colors of the spectrum are overlaid as multiple patterns of dots, sometimes with dots of one color on top of dots of a different color to achieve the desired shades and tones. Thus, in order to keep the image crisp and clear, dot registration (where one dot has to line up precisely upon another dot) is extremely important. A key factor for this dot registration and dot size is the wettability

of the ink to the substrate. For many polyolefins, such as polyethylene or polypropylene or copolymers of such, the hydrophobic nature and low surface energy of the polymer gives very poor ink wettability for both solvent-based and water-based inks.

Figure 1

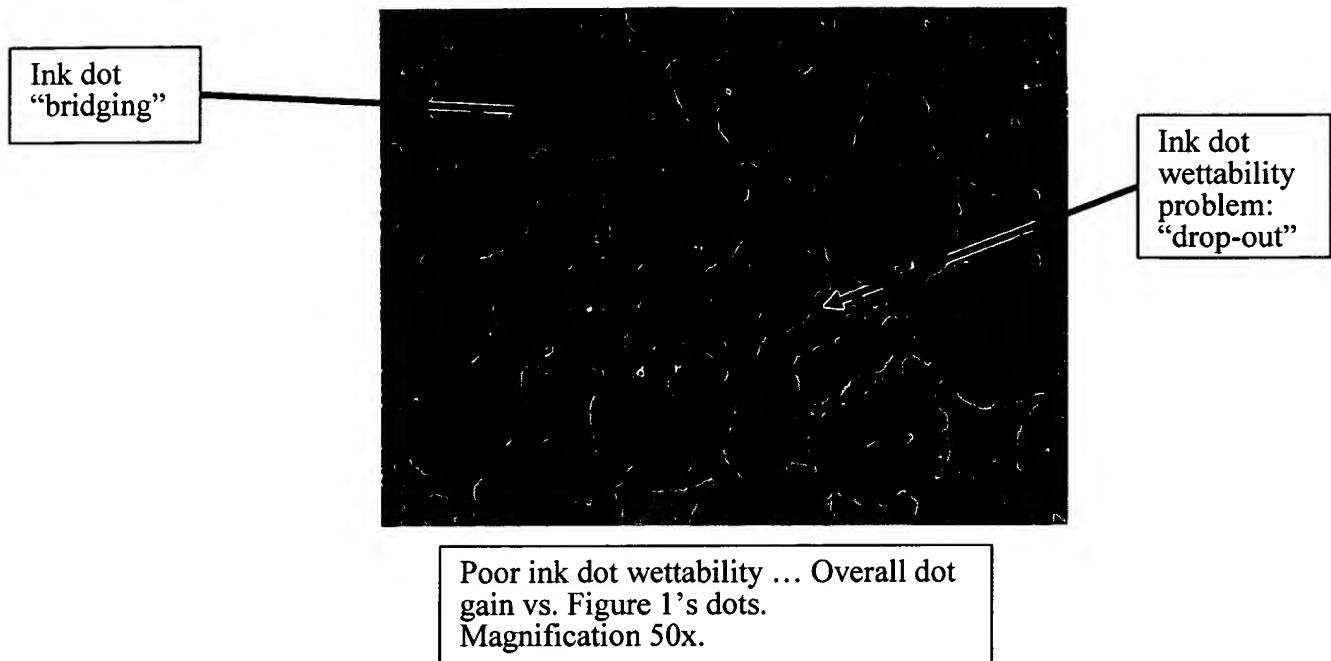


Thus, the polyolefin must be surface-treated to create polar sites and increase the surface energy for “wettability” of the inks to adhere properly and efficaciously. (Typically, a surface energy of 38 dynes/cm is the minimum required for high-quality process printing. Untreated polyolefin substrates such as polypropylene have a surface energy of below 30 dynes/cm.) Without this surface treatment, many hydrophobic or low surface energy polymers will exhibit poor wetting of ink dots. The fact that a Sharpie pen can “print” on the surface of an untreated film as the Examiner says in paragraph 17 on page 7 of the Action bears no resemblance or correlation to the type of high-quality process printing required in the packaging industry for which our invention is designed for. Furthermore, persons of ordinary skill in the field of laminated polyolefin films to which this invention pertains would not have considered marking a design with a “Sharpie” to be a reasonable or practical method of printing on laminate films.

7. In fact, even with a treated surface, ink wetting problems occur. Figure 2 reproduced below shows poor ink wetting problems such as ink dot dropout (missing or misshapen dots), ink

dot gain (an undesirable increase in dot size which occurs when the printer tries to improve wettability by increasing the pressure of the print roller against the substrate and results in muddier colors and poorer image resolution) and ink dot bridging (dots that merge together which can be caused by the same reasons as dot gain).

Figure 2



Moreover, additives in the print film can greatly affect ink dot wettability even when the print film is treated. In particular, migratory additives such as organic slip additives (such as fatty amides like erucamide or stearamide) or organosiloxanes (e.g. silicone oil) are notorious for being poisons to ink dot wettability (silicone oil in particular, as it is by nature very hydrophobic and of very low surface energy). Although such additives are very useful for keeping the coefficient of friction (COF) of the film low for good machinability, they can be detrimental to ink dot wetting in complex process printing, particularly if such migratory additives are loaded at high levels in the film. Thus, for good printability, it is preferred to keep the amount of migratory additives to a minimum, and ideally, to have no migratory additives. The film of Figure 1 contains no silicone oil. In comparison, the film of Figure 2 contains 400 ppm silicone

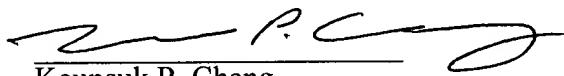
oil. Thus, these figures demonstrate what even a small amount of silicone oil can do to ink dot wetting and formation.

8. Shah and Mizuno (U.S. Patent No. 5,441,802), whose preferred amounts of migratory additives (e.g. silicone oil and fatty amides) are in the range of 2000-5000 ppm (0.2 –0.5%) or more, use significantly higher amounts of additives that are claimed in this application and would exhibit severe process printing problems with ink dot wettability. Our film invention seeks to use no or a very minimal amount of optional migratory additives to maintain both good COF properties as well as high ink dot print receptivity.

9. I further present this Declaration to explain the unexpected results our invention exhibits compared to what Mizuno discloses. Mizuno, similarly to Shah, teaches the use of large amounts of silicone oil for improved processability on high-speed packaging machines (Column 5, lines 49-57) in loadings from 1000 ppm (0.1%) to 10,000 ppm (1%). Our invention, by contrast, seeks to minimize the amount of silicone oil, if not dispense with it altogether. Our invention achieves excellent processability on packaging machines without the use of such high loadings of migratory additives. It also exhibits excellent COF and hot slip properties (COF measured at elevated temperatures), as explained previously in the Amendment of September 3, 2003, at pages 8-9, which Mizuno's film will not have, even with the higher loadings of silicone oil which Mizuno recommends. These hot slip measurements simulate the use of the film under high-speed packaging environments where frictional heating of the packaging film on the packaging machine's various metal surfaces, formers, etc., can cause problems such as sticking, wrinkling, and film breakage. A good hot slip characteristic (i.e. low COF at elevated temperatures) prevents such problems from occurring. In addition, Mizuno teaches that with large loadings of antiblock particles, the addition of acid-modified polypropylene to the film is essential in preventing the particles from falling out and causing powder build-up on the packaging machine (Column 6, lines 20-26). Indeed, Mizuno's Table 1 shows the results of

Comparative Example 1, where a film made without the acid-modified polypropylene was unsuitable for packaging due to unacceptable powder build-up of the antiblock agent. Our invention, by contrast, surprisingly found that this was not true. We have found, and I am personally aware, that the film of our invention -- which does not contain any acid-modified polypropylene -- has never exhibited any powder build-up of antiblock particles either during our film-making production or subsequently in our customer chain-of-use from printing to laminating, and finally, through packaging. This result -- validated in many customer qualification, scale-up, and commercial trials – is significantly contrary to Mizuno's results.

I declare under penalty of perjury that the foregoing is true and correct. Executed at North Kingstown, Rhode Island, this 8 day of March, 2004.


Keunsuk P. Chang